

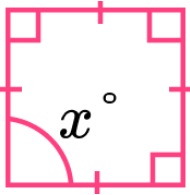
Angles in a Quadrilateral - Worksheet

Skill

Group A - Core skill practice

Calculate the missing angle x in each diagram below. Use properties of quadrilaterals to help you.

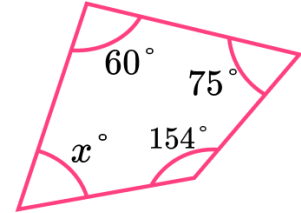
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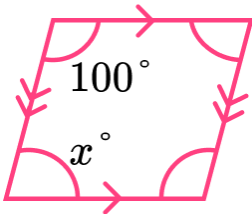
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3)



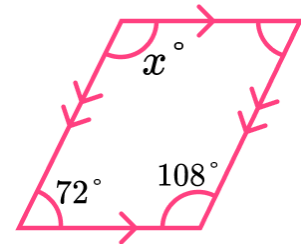
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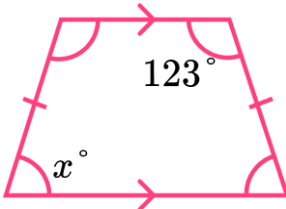
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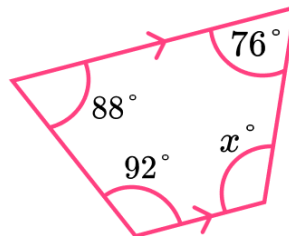
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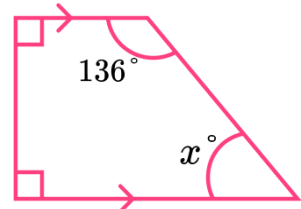
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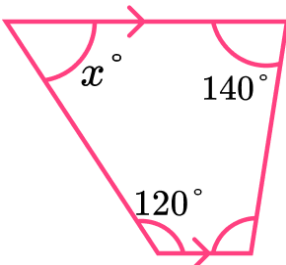
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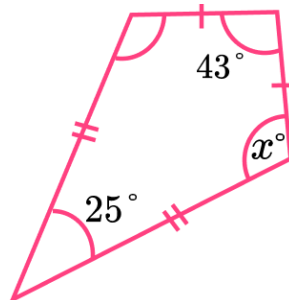
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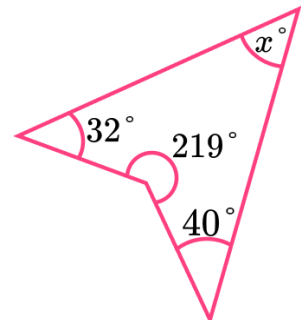
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11)



12)

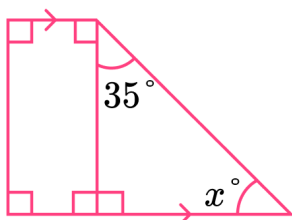


Angles in a Quadrilateral - Worksheet

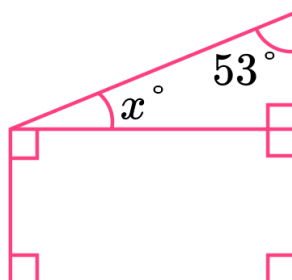
Group B - Complex diagrams

Calculate the missing angles in each diagram.

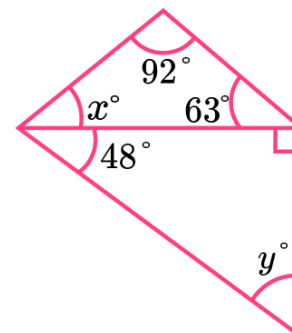
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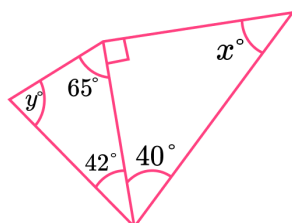
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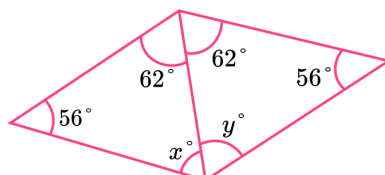
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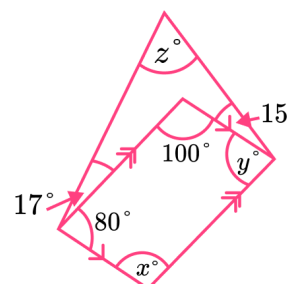
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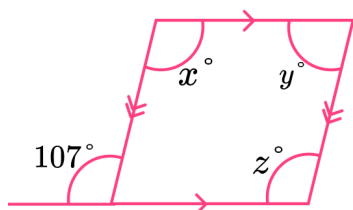
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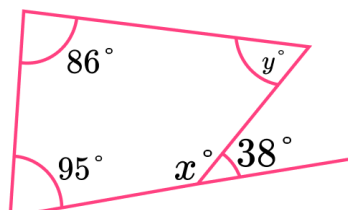
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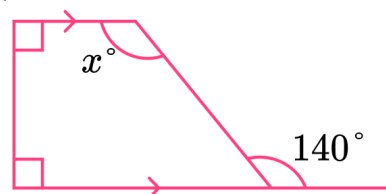
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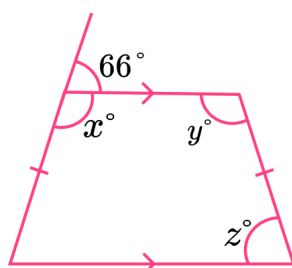
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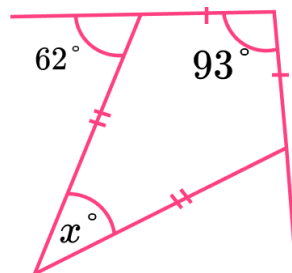
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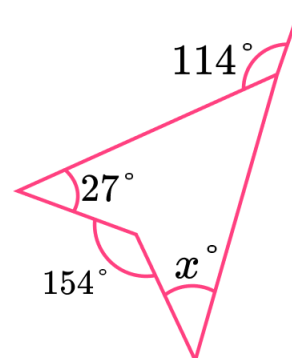
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11)



12)

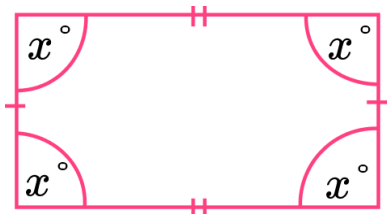


Angles in a Quadrilateral - Worksheet

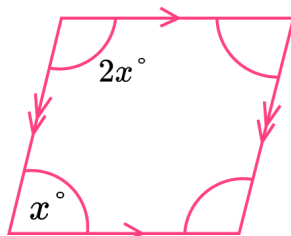
Group C - Form and solve equations

Calculate the value for x by forming and solving an equation for each diagram.

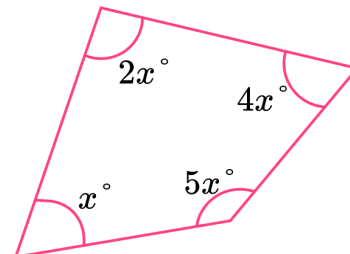
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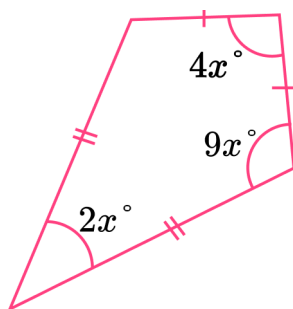
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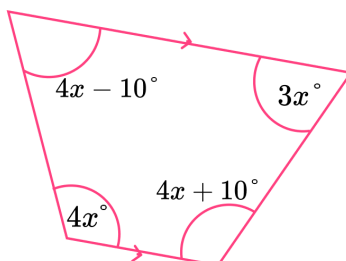
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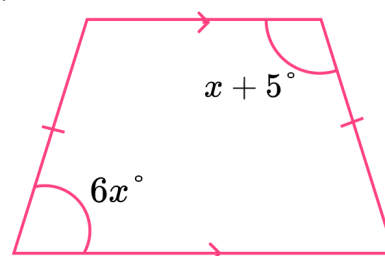
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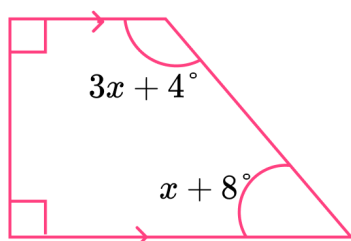
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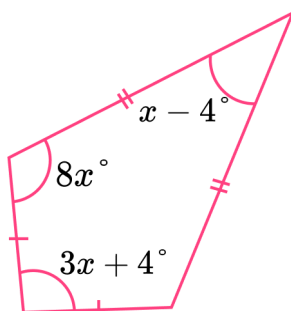
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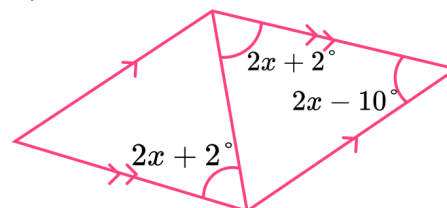
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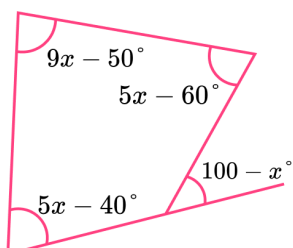
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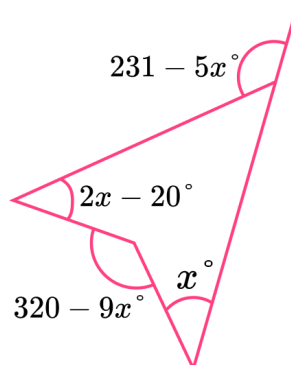
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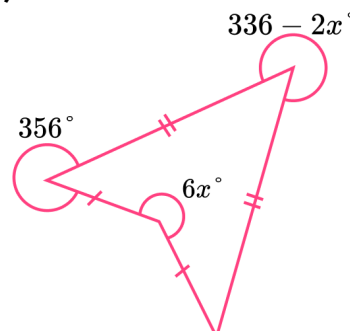
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11)



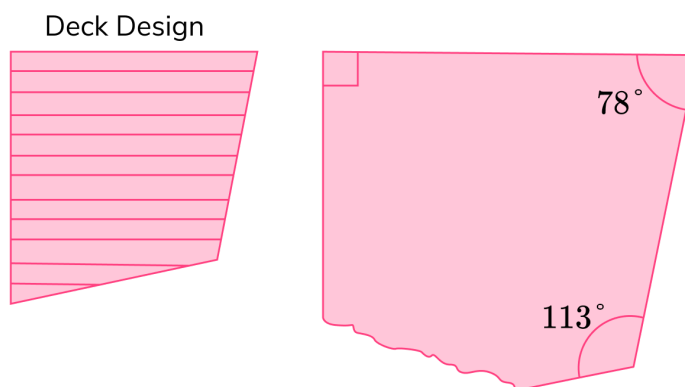
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Angles in a Quadrilateral - Worksheet

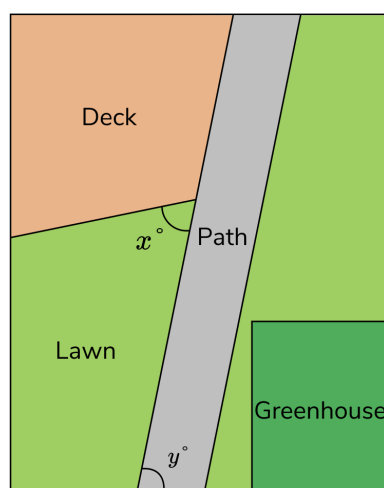
Applied

- 1) (a) Below is the design of a deck for a garden.



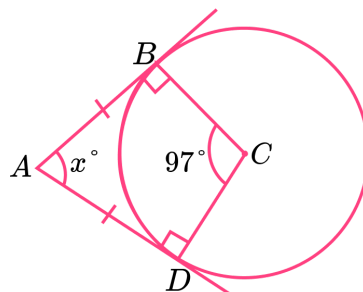
The design was damaged and so one angle is missing off the diagram. What is the size of the missing angle?

- (b) The deck is situated at the end of the garden. The path is in the shape of a parallelogram. Use this information to calculate the angles x and y .

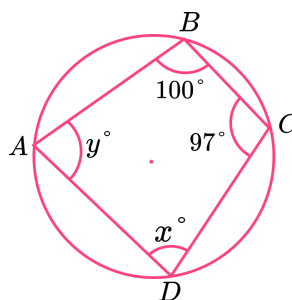


Angles in a Quadrilateral - Worksheet

- 2) (a) Two tangents to a circle meet at point A . Calculate the size of angle x .

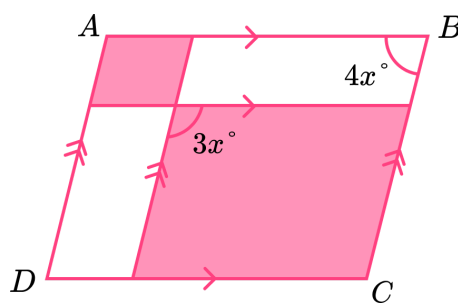


- (b) $ABCD$ is a cyclic quadrilateral (a quadrilateral inscribed inside a circle).



Calculate the values of x and y .

- 3) (a) $ABCD$ is a parallelogram made up of 4 smaller parallelograms.

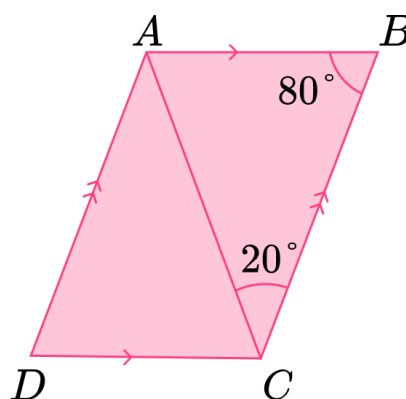


Calculate the value of x correct to 1 decimal place.

- (b) Calculate the angle BCD correct to 1 decimal place.

Angles in a Quadrilateral - Worksheet

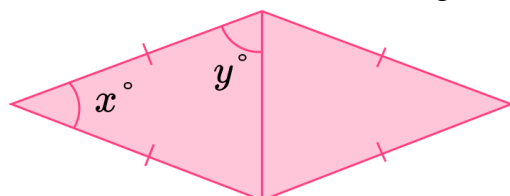
- 4) (a) $ABCD$ is a parallelogram. Show that the line AC splits the parallelogram into two isosceles triangles.



- (b) What type of triangles are created when another quadrilateral $EFGH$ is a rhombus?

Angles in a Quadrilateral - Exam Questions

- 1) (a) Two isosceles triangles are placed next to each other so that they share 1 edge of the same length. Below is a sketch of one orientation of the two triangles.

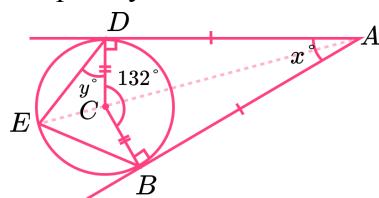


In the space below, sketch the two other possible orientations. Label all the angles.

- (b) If $x + y = 105^\circ$ and $2y + x = 180^\circ$, calculate the values of x and y .

.....
(3)
(7 marks)

- 2) (a) Two tangents of a circle with centre C meet at point A . Calculate the angle BAD . Explain your answer.

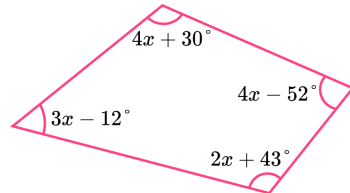


- (b) The line EA is a straight line that goes through the centre of the circle. Calculate the value of the angle CDE .

.....
(4)
(6 marks)

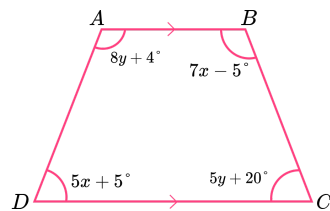
Angles in a Quadrilateral - Exam Questions

- 3) (a) Use the information in the diagram to calculate the value for x (3)

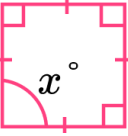
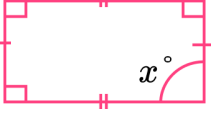
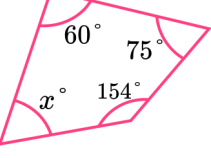
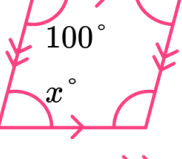
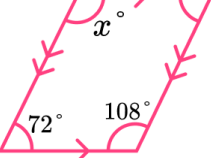
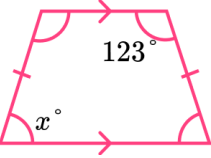
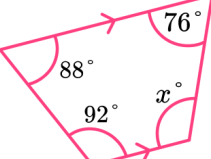


- (b) Is the quadrilateral in part A a cyclic quadrilateral? Explain your answer. (3)
(6 marks)

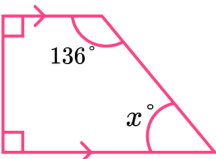
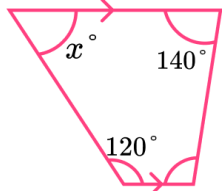
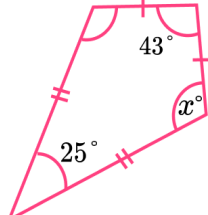
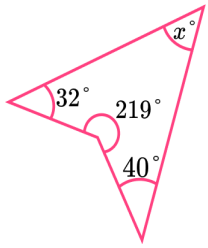
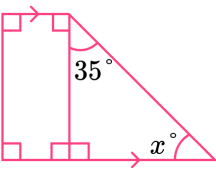
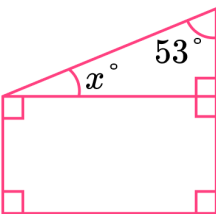
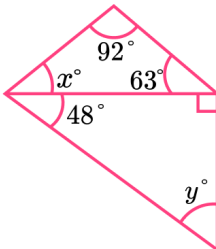
- 4) Show that $ABCD$ is an isosceles trapezium. (7 marks)



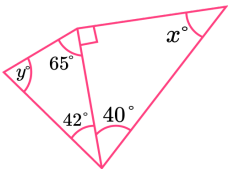
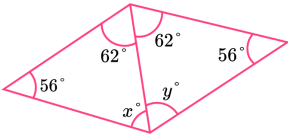
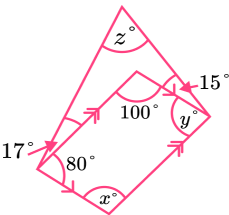
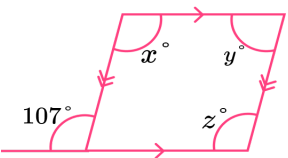
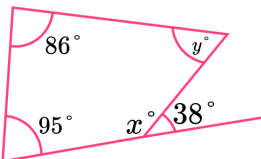
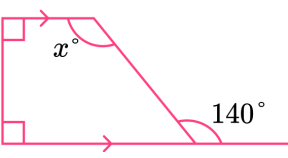
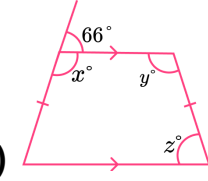
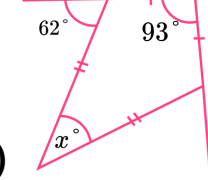
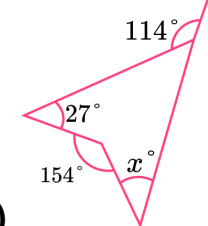
Angles in a Quadrilateral - Answers

	Question	Answer
	Skill Questions	
Group A	Calculate the missing angle x in each diagram below. Use properties of quadrilaterals to help you. 1)  2)  3)  4)  5)  6)  7)  8) 	1) $x = 90^\circ$ 2) $x = 90^\circ$ 3) $x = 71^\circ$ 4) $x = 80^\circ$ 5) $x = 85^\circ$ 6) $x = 108^\circ$ 7) $x = 57^\circ$ 8) $x = 104^\circ$

Angles in a Quadrilateral - Answers

	9)  10)  11)  12) 	9) $x = 44^\circ$ 10) $x = 60^\circ$ 11) $x = 56^\circ$ 12) $x = 69^\circ$
Group B	Calculate the missing angles in each diagram. 1)  2)  3) 	1) $x = 55^\circ$ 2) $x = 37^\circ$ 3) $x = 25^\circ, y = 42^\circ$

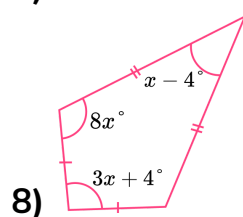
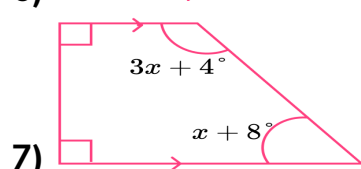
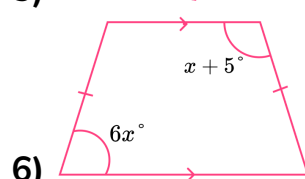
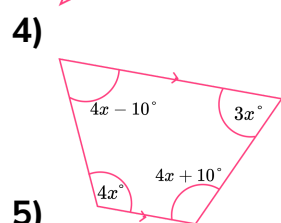
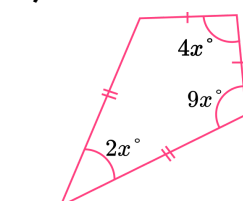
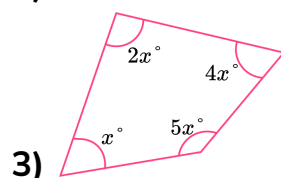
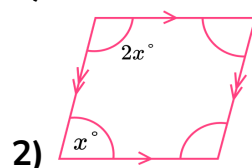
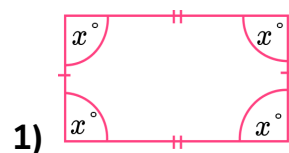
Angles in a Quadrilateral - Answers

	4)  5)  6)  7)  8)  9)  10)  11)  12) 	4) $x = 50^\circ$, $y = 73^\circ$ 5) $x = 62^\circ$, $y = 62^\circ$ 6) $x = 100^\circ$, $y = 80^\circ$, $z = 68^\circ$ 7) $x = 107^\circ$, $y = 73^\circ$, $z = 107^\circ$ 8) $x = 142^\circ$, $y = 37^\circ$ 9) $x = 140^\circ$ 10) $x = 114^\circ$, $y = 114^\circ$, $z = 66^\circ$ 11) $x = 31^\circ$ 12) $x = 61^\circ$
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Angles in a Quadrilateral - Answers

Group C

Calculate the value for x by forming and solving an equation for each diagram.



1) $x = 90^\circ$

2) $x = 60^\circ$

3) $x = 30^\circ$

4) $x = 15^\circ$

5) $x = 24^\circ$

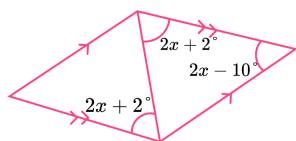
6) $x = 25^\circ$

7) $x = 42^\circ$

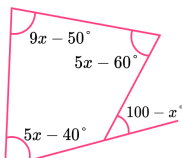
8) $x = 18^\circ$

Angles in a Quadrilateral - Answers

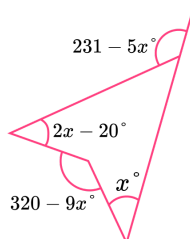
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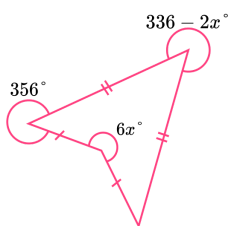
10)



11)



12)



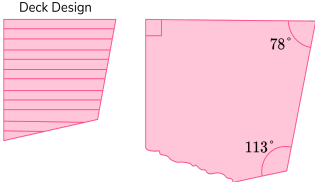
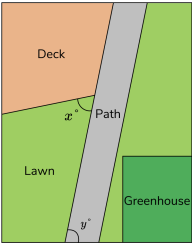
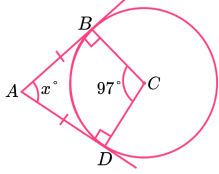
9) $x = 31^\circ$

10) $x = 19^\circ$

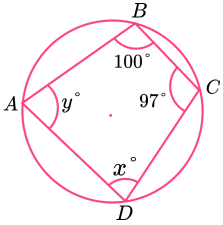
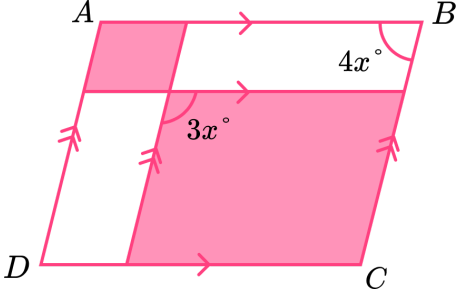
11) $x = 23^\circ$

12) $x = 47^\circ$

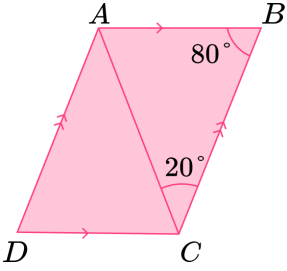
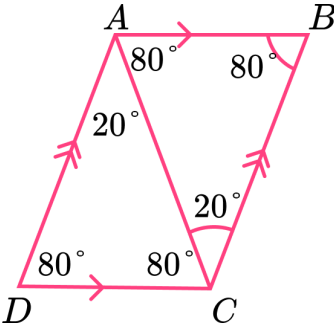
Angles in a Quadrilateral - Answers

	Question	Answer
	Applied Questions	
1)	(a) Below is the design of a deck for a garden.  The design was damaged and so one angle is missing off the diagram. What is the size of the missing angle? (b) The deck is situated at the end of the garden. The path is in the shape of a parallelogram. Use this information to calculate the angles x and y. 	(a) $113 + 78 + 90 = 281$ $360 - 281 = 79^\circ$ (b) Angles on a straight line total 180°. $x = 180 - 113 = 67^\circ$ $180 - 78 = 102^\circ$ Supplementary angles in a parallelogram sum to total 180° $y = 180 - 102 = 78^\circ$
2)	(a) Two tangents to a circle meet at point A. Calculate the size of angle x. 	(a) $x = 360 - (90 + 90 + 97)$ $x = 83^\circ$

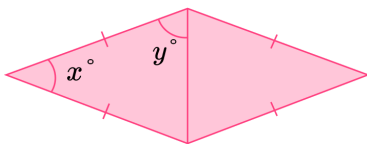
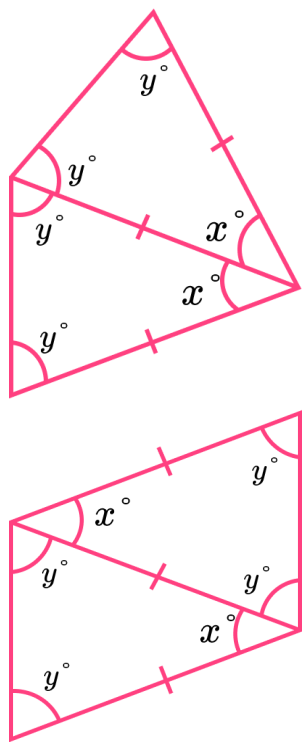
Angles in a Quadrilateral - Answers

	(b) $ABCD$ is a cyclic quadrilateral (a quadrilateral inscribed inside a circle).  Calculate the values of x and y.	(b) Opposite angles in a cyclic quadrilateral total 180°. $x = 180 - 100 = 80^\circ$ $y = 180 - 97 = 83^\circ$
3)	(a) $ABCD$ is a parallelogram made up of 4 smaller parallelograms.  Calculate the value of x correct to 1 decimal place. (b) Calculate the angle BCD correct to 1 decimal place.	(a) $4x + 3x + 4x + 3x = 360$ $14x = 360$ $x = 25.7^\circ$ (1dp) (b) $BCD = 3x = 77.1^\circ$ (1dp)

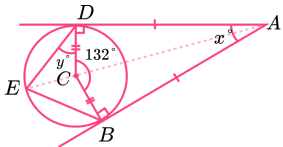
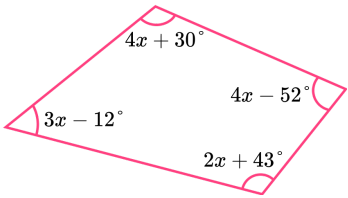
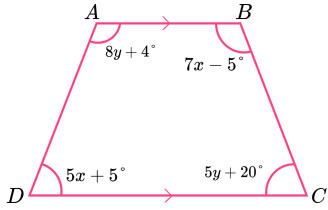
Angles in a Quadrilateral - Answers

4)	(a) $ABCD$ is a parallelogram. Show that the line AC splits the parallelogram into two isosceles triangles.  (b) What type of triangles are created when another quadrilateral $EFGH$ is it a rhombus?	(a)  $CAB = 80^\circ$ (angles in a triangle) $CDA = 80^\circ$ (opposite angles in a parallelogram are equal) $BCD = 100^\circ$ (supplementary angles total 180°) so $ACD = 80^\circ$ $DAC = 20^\circ$ (b) Two isosceles triangles (base to base)
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Angles in a Quadrilateral - Mark Scheme

	Question	Answer
	Exam Questions	
1) (a)	Two isosceles triangles are placed next to each other so that they share 1 edge of the same length. Below is a sketch of one orientation of the two triangles.  In the space below, sketch the two other possible orientations. Label all the angles.	(a)  (1) (1) (1) (1)
(b)	If $x + y = 105^\circ$ and $2y + x = 180^\circ$, calculate the values of x and y.	(b) $x + y = 105^\circ$ (A) $x + 2y = 180^\circ$ (B) $(B) - (A) : y = 75^\circ$ (1) When $y = 75^\circ$ $x + 75 = 105$ (A) (1) $(-75) \quad (-75)$ $x = 30^\circ$ (1) So $x = 30^\circ, y = 75^\circ$

Angles in a Quadrilateral - Mark Scheme

2) (a)	Two tangents of a circle with centre C meet at point A. Calculate the angle BAD. Explain your answer. 	(a) $180 - 132 = 48^\circ$ Angles in a quadrilateral total 360°.	(1) (1)
(b)	The line EA is a straight line that goes through the centre of the circle. Calculate the value of the angle CDE.	(b) CDE is isosceles as $CD = DE = \text{radius}$ $CED = CDE$ $360 - 132 = 228$ $ECD = 228 \div 2 = 114$ Angle at the centre is twice the angle at the circumference so $BED = 132 \div 2 = 66^\circ$ So $CED = 66 \div 2 = 33^\circ$ $y = 180 - (114 + 33)$ $y = 33^\circ$	(1) (1) (1) (1)
3) (a)	Use the information in the diagram to calculate the value for x. 	(a) $4x + 30 + 4x - 52 + 2x + 43 + 3x - 12 = 360$ $13x + 9 = 360$ $13x = 351$ $x = 27^\circ$	(1) (1) (1)
(b)	Is the quadrilateral in part A a cyclic quadrilateral? Explain your answer.	(b) No because opposite angles in a cyclic quadrilateral total 180° and the angles in the quadrilateral are: $138^\circ, 97^\circ, 69^\circ, 56^\circ$	(3)
4)	Show that $ABCD$ is an isosceles trapezium. 	(a) $7x - 5 = 8y + 4$ +5 +5 $7x = 8y + 9$ -8y -8y $7x - 8y = 9$	(1)

Angles in a Quadrilateral - Mark Scheme

		$5x + 5 = 5y + 20$ $\textcircled{-5} \quad \textcircled{-5}$ $5x = 5y + 15$ $\textcircled{-5y} \quad \textcircled{-5y}$ $5x - 5y = 15$ $\textcircled{\div 5} \quad \textcircled{\div 5}$ $x - y = 3$ $7x - 8y = 9 \quad \textcircled{A}$ $x - y = 3 \quad \textcircled{B}$ $\textcircled{B} \times 7 : 7x - 7y = 21 \quad \textcircled{C}$ $\textcircled{C} - \textcircled{B} : 7x - 7y = 21$ $\underline{-7x + 8y = -9}$ $0 + y = 12^\circ$ When $y = 12$, $\textcircled{B} \quad x - 12 = 3$ $\textcircled{+12} \quad \textcircled{+12}$ $x = 15^\circ$ $8y + 4 : 8 \times 12 + 4 = 100^\circ$ $7x - 5 : 7 \times 15 - 5 = 100^\circ \quad \left. \vphantom{\begin{matrix} 8y + 4 \\ 7x - 5 \end{matrix}} \right\} \text{equal}$ $5x + 5 : 5 \times 15 + 5 = 80^\circ$ $5y + 20 : 5 \times 12 + 20 = 80^\circ \quad \left. \vphantom{\begin{matrix} 5x + 5 \\ 5y + 20 \end{matrix}} \right\} \text{equal}$ <i>ABCD is an isosceles trapezium</i>	(1) (1) (1) (1) (1) (1)
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